SRPC
Intellectual Property Department

Etudes & Productions Schlumberger
1, rue Henri Becquerel B.P. 202
92142 Clamart Cedex - France
Tel. + 33 (0)1 45 37 21 33
Fax + 33 (0)1 45 37 20 10

Schlumberger

FAX 4989 23994465

International Preliminary Examining Authority
European Patent Office
Directorate General 2
D-80298 München
Germany

Clamart, March 17, 2005

International Patent Application no. **PCT/EP2003/013147**
Applicants: **Services Pétroliers Schlumberger et al.**
Our Ref: **WO 21.1065**

Dear Sirs,

I refer to the Written Opinion dated February 2005 and enclose herewith triplicate copies of an amended set of claims to replace the claims presently on file.

With regard to the specific comments in item V of the written opinion, the applicants comment as follows:

The new set of claims is believed to overcome the objection of novelty raised against claim 1 and 7 as filed. Document D1, US 5 539 225 discloses an apparatus and method which include neutron source and detectors for determining formation porosity, density and lithology as well as gas detection. However, document D1 does not disclose any downhole preprocessing of the raw spectroscopy data and downhole spectral stripping in order to determine elemental yields. Whereas document D1 discloses preferable solution of having processing means included in the bottom hole assembly 36, it does not specifically describes function of said processing means. Furthermore, as regard to col.9, l.1-19 and col.14, l.8-13, it is not mentioned that lithology information are retrieved from downhole processing.

Problem to be soled by the method and apparatus of the invention relates to decreasing of data volume to be sent from downhole location to surface facilities in order to increase either accuracy of the lithology information but also drastically increase time needed to make this information available. The apparatus and method according to the invention make possible real-time display of the formation lithology, which represents a huge commercial advantage, especially in the LWD and MWD environment.

The applicants believe that this response addresses the issues raised by the examiner and request that a favorable international preliminary examination report be issued forthwith.

Yours faithfully,

Hélène RAYBAUD
European Patent Attorney

Claims

1- A method for downhole spectroscopy processing comprising:

obtaining raw spectroscopy data using a downhole tool;

processing downhole the raw spectroscopy data using the downhole tool to obtain a downhole processed solution;

transmitting the downhole processed solution to a surface processing system; and

using the surface processing system to determine lithology information from the downhole processed solution

wherein processing the raw spectroscopy data comprises:

pre-processing downhole the raw spectroscopy data to obtain a net capture spectra; and

performing spectral stripping using time information and the net capture spectra to determine elemental yields.

2- The method of claim 1, wherein processing comprises time-stacking the raw spectroscopy data.

3- The method of claim 1 or claim 2, further comprising comparing the downhole processed solution with data obtained from another downhole tool.

4- The method of any of claims 1-3, further comprising displaying the lithology information on a user interface.

5- The method of any of claims 1-4, wherein processing the raw spectroscopy data further comprises:

determining dry weight elemental concentrations using the elemental yields;

determining a dry weight for at least one selected from the group consisting of clay, carbonate, quartz-feldspar-mica, pyrite, anhydride, siderite, salt, and coal using the dry weight elemental concentrations; and

computing a matrix property using the dry weight elemental concentrations.

6- A downhole tool for processing raw spectroscopy data, comprising:

at least one detector for detecting the raw spectroscopy data;

processing means for processing the raw spectroscopy data to produce a downhole processed solution; and

means for transmitting the downhole processed solution to a surface location,

wherein the processing means comprises:

means for pre-processing the raw spectral data to obtain a net capture spectra;

means for performing spectral stripping using time information and the net capture spectra to determine elemental yields

7- The downhole tool of claim 6, wherein the processing means comprises means for determining elemental yields.

8- The downhole tool of claim 6 or claim 7, wherein the processing means comprises means for computing a matrix property.

9- The downhole tool of any of claims 6-8, wherein the processing means further comprises means for determining dry weight elemental concentrations using the elemental yields.

10- The downhole tool of claim 9, wherein the processing means further comprises:

means for determining a dry weight for at least one selected from the group consisting of clay, carbonate, quartz-feldspar-mica, pyrite, anhydride, siderite, salt, and coal using the dry weight elemental concentrations; and

means for computing a matrix property using the dry weight.

11- The downhole tool of any of claims 6-10, wherein the processing means comprises:

a digital signal processor (516);

a power supply (520) operatively connected to the digital signal processor (516);

a local memory (518) operatively connected to the digital signal processor (516); and

a processing interface (514) operatively connected to the digital signal processor (516).

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

RAYBAUD Helene
ETUDES ET PRODUCTIONS SCHLUMBERGER
1, rue Henri Becquerel
BP 202
F-92142 Clamart Cedex
FRANCE

PCT

WRITTEN OPINION
(PCT Rule 66)

Date of mailing *(day/month/year)*	03.02.2005
Applicant's or agent's file reference WO 21.1065	**REPLY DUE within 1 month(s) and 15 days** from the above date of mailing

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP 03/13147	21.11.2003	31.12.2002

International Patent Classification (IPC) or both national classification and IPC
G01V5/04

MT - 17/03/05

Applicant
SERVICES PETROLIERS SCHLUMBERGER et al.

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

I	☒	Basis of the opinion
II	☐	Priority
III	☒	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	☐	Lack of unity of invention
V	☒	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	☐	Certain documents cited
VII	☐	Certain defects in the international application
VIII	☐	Certain observations on the international application

3. The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis. For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 30.04.2005

Name and mailing address of the international preliminary examining authority:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized Officer
Juárez Colera, M

Formalities officer (incl. extension of time limits)
Püschel, S
Telephone No. +49 89 2399-5812

I. Basis of the opinion

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed")*:

Description, Pages

1-16 as originally filed

Claims, Numbers

1-19 as originally filed

Drawings, Sheets

1/9-9/9 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   ☐ the language of publication of the international application (under Rule 48.3(b)).
   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.
   ☐ filed together with the international application in computer readable form.
   ☐ furnished subsequently to this Authority in written form.
   ☐ furnished subsequently to this Authority in computer readable form.
   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:
   ☐ the claims, Nos.:
   ☐ the drawings, sheets:

5. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been and will not be examined in respect of:

   ☐ the entire international application,

   ☒ claims Nos. 14-19

   because:

   ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

   ☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 14-19 are so unclear that no meaningful opinion could be formed *(specify)*:

   see separate sheet

   ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

   ☐ no international search report has been established for the said claims Nos.

2. A written opinion cannot be drawn due to the failure of the nucleotide and/or amino acid sequence listing to comply with the Standard provided for in Annex C of the Administrative Instructions:

   ☐ the written form has not been furnished or does not comply with the Standard.

   ☐ the computer readable form has not been furnished or does not comply with the Standard.

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1,2,5,7-9 NO
Inventive step (IS)	Claims	1-13 NO
Industrial applicability (IA)	Claims	1-13 YES

2. Citations and explanations

   see separate sheet

Re Item I
Basis of the report

The present opinion is based on the subject matter of claims 1-13. The reasons therefore are set forth on Item III bellow.

Re Item III
Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1 This application contains 19 claims, 3 of which are independent having overlapping scope. The various definitions of the invention given in these independent claims are such that the claims are not concise contrary the requirements of Article 6 PCT. Moreover, lack of clarity of the application as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought.

2 Claim 13 includes all the features of claim 7. Hence, claim 13 should be reformulated as a claim dependent on claim 7, cf. Rule 6.4 (a)-(c) PCT. Furthermore, the subject matter of dependent claims 14-19 is redundant with that of claims 8-12.

3 No meaningful opinion is thus formed on novelty, inventive step or industrial application concerning the claims 14-19.

4 The claims should be recast to be clearly formulated and to include only the minimum necessary number of independent claims in any one category followed by dependent claims covering features which are merely optional (Rule 6.4 PCT). In the present case it is considered appropriate to use only one independent claim per category.

5 If, however, an amended set of claims containing more than one independent claim per category is sent, the applicants are asked to indicate the "special technical features" linking these claims so that a "single general inventive concept" is formed.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following document:

D1: US-A-5 539 225 (HOLENKA JACQUES M ET AL) 23 July 1996 (1996-07-23)

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1,2,5,7-9 and 13 is not new in the sense of Article 33(2) PCT.

2.2 The document D1 discloses (abstract; c.6, l. 14-22; c. 8, l. 54-59; c. 9, l. 1-19; c. 16, l.7-11, c.18, l. 16-19 and Fig.1): a method and apparatus for downhole spectroscopy processing containing the steps, and means therefor, stated in the above-mentioned claims.

3.1 Dependent claims 2, 3, 6, and 10-12.do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.

3.2 The additional features introduced by those claims constitute part of the normal processing techniques known by the persons skilled in the art. They are therefore considered as merely some of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill.

3.3 Consequently the present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of the above-mentioned claims does not involve an inventive step in the sense of Article 33(3) PCT.